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# **curriculum for Technician Diploma Program in Hybrid Vehicles Technology Specialization**

The curriculum of Technician Diploma in “Hybrid Vehicles Technology” consists of (66) credit hours as follows:

No.	Field of Requirements	Credit Hours
1	Generic Skills	6
2	Employability Skills	9
3	Supportive Sciences	9
4	Specialization Skills	42
<b>Total</b>		<b>66</b>

Curriculum for Technician Diploma Program  
in  
Hybrid Vehicles Technology Specialization

First: Generic Skills Requirements (6) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10000111	Positive Citizenship and Life Skills	3	3	0	-
10000112	Skills in English Language	3	3	0	-
<b>Total</b>		<b>6</b>	<b>6</b>	<b>0</b>	

Second: Employability Skills Requirements (9) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10000121	Communication Skills in English Language	3	3	0	10000112
10000122	Small Productive Enterprises Management	3	3	0	-
10000123	Supervision and Industrial Organization	3	3	0	-
<b>Total</b>		<b>9</b>	<b>9</b>	<b>0</b>	

Third: Supportive Sciences Requirements (9) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10100111	Applied Mathematics	3	3	0	-
10100121	Applied Physics	3	3	0	-
10100122	Applied Physics Laboratory	1	0	3	10100121*
10100131	AutoCAD	1	0	3	
10100141	Engineering Workshop	1	0	3	
<b>Total</b>		<b>9</b>	<b>6</b>	<b>9</b>	

\*Co-requisite

Curriculum for Technician Diploma Certificate Program  
in  
Hybrid Vehicles Technology Specialization

Fourth: Specialization Skills Requirements (42) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10200111	Electricity and Electronics	2	2	0	10100121
10200112	Electricity and Electronics Laboratory	1	0	3	10200111*
10207121	Automotive Engineering	3	3	0	
10207122	Automotive Engineering Workshop	1	0	3	10207121*
10207111	Internal Combustion Engines	3	3	0	
10207112	Internal Combustion Engines Laboratory	1	0	3	10207111*
10220111	Automotive Sensors and Actuators	3	3	0	
10220112	Automotive Sensors and Actuators Laboratory	1	0	3	10220111*
10210221	Automotive Electricity and Electronics	2	2	0	10200111
10220221	Automotive Electricity and Electronics Laboratory	2	0	6	10210221*
10220231	Hybrid Vehicles	3	3	0	
10220232	Hybrid Vehicles Workshop	2	0	6	10220231*
10220241	Electric Vehicles	2	2	0	
10220242	Electric Vehicles Workshop	2	0	6	10220241*
10220251	Hybrid Vehicles Diagnosis, Maintenance and Repair	3	3	0	10220231*
10220252	Hybrid Vehicles Diagnosis, Maintenance and Repair Workshop	2	0	6	10220251*
10220261	Automotive Climate Control Systems	2	2	0	
10220262	Automotive Climate Control Systems Lab.	1	0	3	
10220271	Basic Hybrid and Electric Vehicle Safety	2	2	0	(10220231 + 10220241)*
10220272	Basic Hybrid and Electric Vehicle Safety Lab.	1	0	3	10220271
10220291	Training	3	0		
<b>Total</b>		<b>42</b>	<b>25</b>		

\*-Co-requisite

## Guiding Plan for Hybrid Vehicles Technology Specialization/ Technical Diploma Program

First Semester			Second Semester		
Course No.	Course Title	C.H.	Course No.	Course Title	C.H.
10000111	Positive Citizenship and Life Skills	3	10000121	Communication Skills in English Language	3
10000112	Skills in English Language	3	10100131	AutoCAD	1
10100111	Applied Mathematics	3	10207121	Automotive Engineering	3
10100121	Applied Physics	3	10207122	Automotive Engineering Workshop	1
10100122	Applied Physics Laboratory	1	10207111	Internal Combustion Engines	3
10100141	Engineering Workshop	1	10207112	Internal Combustion Engines Laboratory	1
10200111	Electricity and Electronics	2	10220111	Automotive Sensors and Actuators	3
10200112	Electricity and Electronics Laboratory	1	10220112	Automotive Sensors and Actuators Lab.	1
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>16</b>

Third Semester			Fourth Semester		
Course No.	Course Title	C.H.	Course No.	Course Title	C.H.
10000123	Supervision and Industrial Organization	3	10000122	Small Productive Enterprises Management	3
10210221	Automotive Electricity and Electronics	2	10220242	Electric Vehicles Workshop	2
10220221	Automotive Electricity and Electronics Laboratory	2	10220251	Hybrid Vehicles Diagnosis, Maintenance and Repair	3
10220231	Hybrid Vehicles	3	10220252	Hybrid Vehicles Diagnosis, Maintenance and Repair Workshop	2
10220261	Automotive Climate Control Systems	2	10220271	Basic Hybrid and Electric Vehicle Safety	2
10220262	Automotive Climate Control Systems Lab.	1	10220272	Basic Hybrid and Electric Vehicle Safety Lab.	1
10220241	Electric Vehicles	2		Training	3
10220232	Hybrid Vehicles Workshop	2			
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>16</b>

## Brief Course Description for Hybrid Vehicles Technology Specialization

### First: Generic Skills

#### المواطنة الإيجابية ومهارات الحياة 10000111 (3:0-3):

يوضح المساق مفهوم المواطنة ومهارات الحياة وأهميتهما في اكتساب مهارات قيمة، والعمل على استخدام هذه المهارات في سعيهم للحصول على تعليم أفضل ونتائج ايجابية في العمل، حيث ان المساق يراعي بناء المعرفة في الموضوعات التي يتضمنها البرنامج كما ويبني المهارة عند الشباب لاستخدامها في تطبيق المعرفة كما ويبني الثقة في قدرات الشباب على استخدام هذه المعرفة والمهارة بالاضافة الى توفير الدعم الشخصي والبيئي لتغيير السلوك من خلال تعزيز قيم المواطنة الايجابية والثقافة المجتمعية البناء والعمل المجتمعي التطوعي.

#### Skills in English Language 10000112 (3:3-0)

This is a General English Language course which aims at developing the four English Language receptive and productive Skills; Listening, Reading, Writing and Speaking, as well as providing practice for the basics of grammar and vocabulary for effective and meaningful communication inside and outside the classroom.

### Second: Employability Skills

#### Communication Skills in English Language 10000121 (3:3-0)

This is a communication skills course which aims at improving learners' oral and written communication skills by providing learners with the language needed to naturally and confidently communicate in an English speaking workplace environment and real life situations.

#### إدارة المنشآت الإنتاجية الصغيرة 10000122 (3:3-0)

يوضح المساق مفهوم المنشآت الإنتاجية الصغيرة وأهميتها في الإقتصاد الوطني والقضاء على البطالة، وكيفية إدارتها و مواجهة التحديات التي تعترضها، وتقييم فرص نجاحها من خلال دراسة الجدوى، وآلية إدارة المشتريات والمخزون، وكيفية تمويلها وإدارة شؤونها المالية، وتقديم خدمة العملاء وكذلك الالتزام بأخلاقيات العمل، وكيفية عمل تسويق لها، والطبيعة القانونية لها وخطة العمل اللازمة للبدء بها مع التركيز على التجربة الأردنية في هذا المجال.

#### الإشراف والتنظيم الصناعي 10000123 (3:3-0)

المنشآت الصناعية انواعها ومواصفاتها واشكالها ، اشكال التنظيم الاداري وميزاتها، دور الفني في تطوير الصناعة ودوره في التسلسل الهرمي في المؤسسة الصناعية و ادارة ظروف العمل في المنشآت الصناعية . التعرف على المخاطر وطرق السيطرة عليها . التعرف على أجهزة ومعدات الحماية حسب المواصفات المعتمدة، اصناف الحريق معدات مكافحة،

الكهرباء مخاطرها تأثيراتها على الانسان الحماية من الكهرباء والمعالجة من الصدمة الكهربائية، التعامل مع المواد الكيماوية  
آثارها مخاطرها وشروط التخزين،القوانين المحلية والضمان الاجنماعي.

### Third: Supportive Sciences

#### **Applied Mathematics 10100111 (3: 3-0)**

Real numbers coordinate planes, lines, distance and circles. Functions: (operations and graphs on functions), limits, continuity, limits and continuity of trigonometric functions. Exponential and logarithmic functions. Differentiation (techniques of differentiation, chain rule, implicit differentiation). Application of differentiation (increase, decrease, concavity). Graphs of polynomials. Applications: Rolle's Theorem and Mean-Value Theorem, Integration (by substitution, definite integral, fundamental theorem of Calculus). Application of definite integral (area between two curves, volumes)

#### **Applied Physics 10100121 (3: 3-0)**

Applied Physics course designed to explain the basic concepts of physics in two fields:  
1- Concepts and applications of mechanical physics including: Vectors, motion in one dimension, Laws of Motion (Newton's laws), work and energy and the linear momentum.  
2- Concepts of electricity including: electrical force, electrical field, electrical potential difference, capacitance, current and resistance.

#### **Applied Physics Laboratory 10100122 (1:0-3)**

Applied Physics Lab course is to accompany the General Physics course.  
Laboratory experiments will be in Mechanics and Electricity to reinforce the theoretical portion in the General Physics course.

#### **AutoCAD 10100131 (1:0-3)**

Introduction to AutoCAD, application of AutoCAD, commands, geometric entities. geometric construction. dimensioning, free-hand sketching, object representation, orthographic drawing and projections

#### **Engineering Workshop 10100141 (1:0-3)**

Apply basic manual skills in engineering workshops: mechanical, electrical and carpentry.

### Fourth: Specialization Skills

#### **Automotive Engineering 10207121 (3:3-0)**

Introduction of fundamentals of engine construction and operation, engine systems, automotive transmission (manual and automatic), suspension system, wheel alignment, automotive brake system, steering system, automotive electric and electronic systems.

#### **Internal Combustion Engines 10207111 (3: 3-0)**

Definition and introduction to the ( ICE ) fundamentals of engine, operation engine types and classification, engine construction, engine measurements and performance, engine system (lubrication, cooling, fuel ) Including both carburetor and electronic fuel injection system

**Internal Combustion Engines Laboratory 10207112 (1: 0-3)**

Performance tests for spark and compression engines, air and fuel consumption, air fuel ratio, brake and indicated horse power. Specific fuel consumption, volumetric efficiency, energy balance, variable compression ratio, engine emission, diagnostic, adjustment of engine.

**Automotive Sensors and Actuators 10220111 (3: 3-0)**

Introduction, Electronic systems, Inputs, Outputs, Electrical / Electronic signals.

Input Devices: Switches, Phototransistors, Hall –Effect Devices, Thermistors, Potentiometers, Photoresistors, Variable Reluctance devices, Piezoelectric Sensors.

Input sensors: Position / Speed Sensors, Crankshaft Position sensors, camshaft position sensor, Air Flow Sensors, M A P Sensors, Engine coolant temperature sensor, Throttle Position Sensor, Temperature Sensors, O<sub>2</sub>- sensors, Knock Sensor, Sensors Applications.

Electronic control Unit ( ECU ) parts, memories, principle of operation. Internal Processing, RAMs, ADC and DAC. System outputs: Transistors, Actuators, Fuel injectors, Idle Speed control, ABS actuators.

**Automotive Sensors and Actuators Laboratory 10220112 (1: 0-3)**

Engine load Sensors, Speed and Position Sensors, Temperature Sensors, O<sub>2</sub>- Sensors, Knock Sensors, Actuators, Relays, static switches, ignition actuators, Cold start control, Display Devices, Auxiliary Electronic systems.

**Automotive Electricity and Electronics 10210221 (2: 2-0)**

Introduction, battery, starting system, charging system, ignition system, electronic fuel injection system, lights, safety and signaling, driver information and control devices, wiring harnesses, instrument panel, CAN bus technology for automotive application.

**Automotive Electricity and Electronics Laboratory 10220221 (2: 0-6)**

Battery testing, starting system: diagnostics and maintenance, ignition system: diagnostics and maintenance, lights, safety and signaling, automotive generators, automatic control systems.

**Hybrid Vehicles 10220231 (3: 3-0)**

Introduction to hybrid cars, hybrid models of operation for hybrid cars, drive trains, high voltage batteries, hybrid vehicles control system, sensors and actuators on hybrid vehicles.

**Hybrid Vehicles Workshop 10220232 (2: 0-6)**

Construction, assembly and disassembly of: high voltage batteries, internal combustion engine, hybrid vehicles control system, motor generators for hybrid vehicles, brake system, transmission (including power split device 'PSD')

**Electric Vehicles 10220241 (2: 2-0)**

Configuration of Electric Vehicles, Traction motor characteristics, Tractive Effort and Transmission Requirements, Vehicle Performance, Brushed' DC Electric Motor, DC Regulation and Voltage Conversion, Brushless Electric Motors, Basic Terms of Battery Performance and Characterization, Battery Charging Methods and EV Charging Schemes, Run-Time Battery Characterization and Management, Battery Aggregation.

**Hybrid Vehicles Diagnosis, Maintenance and Repair 10220251 (3:3-0)**

Introduction to hybrid vehicles diagnosis , repair and maintenance . diagnosis , repair and maintenance of : high voltage battery , motor generators , internal combustion engine , transmission (including power split device 'PSD') , brake system ,steering system , suspension system .

**Hybrid Vehicles Diagnosis, Maintenance and Repair Workshop 10220252 (2: 0-6)**

Instruments and equipment used for troubleshooting , diagnosis , repair and maintenance . Diagnosis , repair and maintenance of : high voltage battery ;hybrid vehicles control system ;motor generators ; brake system ; steering system ; suspension system ;transmission ((including power split device ('PSD))

**Automotive Climate Control Systems 10220261 (2:2-0)**

Introduction to automotive air conditioning systems, principles of thermodynamic and heat transfer, refrigerants, safety and clutch control devices, basic refrigeration cycle, condenser, fixed orifice tube, compressor, suction accumulator, evaporator core, HP- service valve, LP- service valve, clutch cycling pressure switch .

**Basic Hybrid and Electric Vehicle Safety 10220271 (2: 2-0)**

General high-voltage electrical safety issues in vehicles, Electrical injury, Industry protection against electrical injury, On-board vehicle protection against electrical injury, Power train development issues, Service and repair issues, Vehicle occupant and first responder issues

**Training 10220291 (3)**

Equivalent to 280 training hours in related to specialization enterprises.